# 1999 ANNUAL REPORT OF

# ELECTRIC SERVICE RELIABILITY

# FOR THE ILLINOIS DISTRICT OF

# MIDAMERICAN ENERGY COMPANY

May 31, 2000

# A. Plan for Future Investment and Reliability Improvements

[411.120 b)3) A)]

## i. Description of MidAmerican Energy Company's (MidAmerican) Illinois District [411.120 b) 3) A) i)]

The Illinois District service territory includes the greater Illinois Quad Cities area, which is predominately urban, and outlying areas in and around the cities of Sherrard, Orion and Reynolds, which are mostly rural. The Illinois District is supplied by a 345 kV, 161 kV and 69 kV networked transmission system. There are three 345/161 kV and five 161/69 kV substations served off this network in the Quad Cities (Iowa and Illinois) area. The 161 kV and 69 kV supply from these substations loops throughout the Quad Cities area to serve several 161/13 kV and 69/13 kV substations. These substations supply a radial 13 kV and 4 kV distribution system. The distribution system utilizes approximately 7,460 overhead conductor-miles and 560 underground conductor-miles to serve 82,294 customers in the Illinois District.

The Illinois District transmission system is composed of approximately 3,825[1] poles and supporting structures with an average age of approximately 33 years. The Illinois District distribution system is composed of approximately 84,162 poles and supporting structures with an average age of approximately 29 years. All Illinois District transmission and distribution lines are inspected over a period not exceeding ten years. In addition, the transmission lines are inspected by air or by drive-by at least annually for general condition, damage and right-of-way encroachments. As a result of these periodic inspections and follow-up maintenance and construction, the transmission and distribution facilities maintain adequate mechanical and electrical properties to provide continued safe and reliable service to MidAmerican's Illinois customers.

1- In MidAmerican's 1998 Annual Report of Electric Service Reliability, the number of transmission poles and supporting structures was erroneously reported as 13,586. This number has been changed to 3,825 in this filing to reflect the actual count.

## ii. Projects to Address Reliability Challenges and Associated Time Table

[411.120 b) 3) A) ii) - iv), vi) & vii)]

Each year as part of MidAmerican's Transmission and Distribution (T&D) Capital Budgeting process, the Transmission and Distribution Planning Staff reviews the Illinois District electric system for the next five years to determine what capital improvements are required to maintain a safe and reliable system. This review includes all transmission projects, and those distribution projects with an estimated cost greater than or equal to $100,000. Major capital projects to improve reliability in the Illinois District through 2003 resulting from the 1999 T&D Capital Budgeting process are shown in Attachment A, page 1

Capital projects for the Illinois District distribution system less than $100,000 come from the Illinois District Operations group. Major capital projects budgeted through 2003 are shown in Attachment A, pages 2-3.

In addition to the above capital projects, MidAmerican also has inspection and maintenance programs for its transmission and distribution systems in the Illinois District. Each program with a short description is listed in Attachment B.

The above projects and inspection and maintenance programs are in place to address all outages causes. Both Capital and O&M expenditures are allocated based on the most critical need and where the best benefit for the expenditure can be obtained. The costs for these capital and operations and maintenance (O&M) reliability projects are included in MidAmerican's Electric Capital and O&M budgets. Projected Electric Capital and O&M budget expenditures by MidAmerican in the Illinois District for 2000-2003 are:

**Budgeted Transmission Capital[1] and O&M[2] Expenditures**
**Illinois District**
**2000 – 2003**
**($1,000'S)**

| Category | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|
| **Capital** | $ 537 | $ 853 | $ 214 | $ 413 |
| **O&M** | $1,379 | $1,413 | $1,448 | $1,484 |

1- This represents budgeted capital dollars for projects directly attributable to the Illinois District.

2- This represents Illinois District 2000 budgeted O&M expenses allocated to transmission based on 1999 percentage split for transmission. 2001 – 2003 O&M dollars were derived by escalating 2000 O&M dollars by 3% for labor and 2% for non-labor.

Budgeted transmission capital dollars are higher in the first two years due to projected installations of 13 kV switchgear at Substation 48 and undergrounding of a portion of the 69 kV circuit from Substation 40 to Substation P.

**Budgeted Distribution Capital[3] and O&M[4] Expenditures**
**Illinois District**
**2000 – 2003**
**($1,000'S)**

| Category | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|
| **Capital** | $4,007 | $3,728 | $3,590 | $3,690 |
| **O&M** | $7,042 | $7,219 | $7,402 | $7,589 |

3- This represents budgeted capital dollars for projects directly attributable to the Illinois District.

4- This represents Illinois District 2000 budgeted O&M expenses allocated to distribution based on 1999 percentage split for distribution. 2001 – 2003 O&M dollars were derived by escalating 2000 O&M dollars by 3% for labor and 2% for non-labor.

Budgeted distribution capital dollars are higher in the first year due to purchase of meters associated with the Illinois unbundling initiative.

### iii. Unresolved Reliability Complaints and Actions Taken – Other Utilities, ISOs, ARESs [411.120 b) 3) A) v) & 411.120 b) 3) A) vi)]

MidAmerican Energy Company has no unresolved reliability complaints for the Illinois District to report under this section.

## B. Implementation of 1998 Plan for Future Investment

[411.120 b) 3) B)]

**Transmission Capital Projects**

There were no major, reliability related transmission capital projects for the Illinois District identified in the 1998 Annual Report.

Projected 1999 transmission capital dollars for projects directly related to the Illinois District in the 1998 Annual Report was $472,000. Actual dollars spent was $128,000(see section G-iii). The difference is primarily due to the delay by one year from 1999 to 2000 of the project to underground a portion of the 69 kV circuit from Substation 40 to Substation P. The delay was the result of a local governmental agency associated with the project not being able to procure reimbursement dollars in 1999.

Projected 2000-2002 transmission capital dollars for projects directly related to the Illinois District in the 1998 Annual Report was $2,500,000. Projected dollars for the same period in the 1999 Annual Report is $1,604,000. The difference primarily results from the delay of a project to install a third 161/69 kV transformer at Substation 49 from 2000 to 2003 with a total cost of $1,250,000. This delay is due to load not developing as anticipated.

**Transmission O&M Projects**

Transmission O&M includes a general array of periodic inspections and maintenance performed to maintain adequate mechanical and electrical properties for the safe and reliable operation of MidAmerican's transmission system. Included are the on-going tree trimming, transmission circuit inspection, and transmission wood pole plant inspection programs and the program to replace transmission line spacers listed in Attachment B.

Projected transmission O&M dollars for the Illinois District in 1999 from the 1998 Annual report was $1,467,000. Actual dollars spent was $1,394,000 (see section G-iii).

Projected 2000-2002 transmission O&M dollars for the Illinois District from the 1998 Annual Report was $4,641,000. Projected dollars for the same period in the 1999 Annual Report is $4,240,000.

**Distribution Capital Projects**

An update on distribution capital reliability projects for the Illinois District that were identified in the 1998 Annual Report is shown in Attachment C.

Projected 1999 distribution capital dollars for projects directly related to the Illinois District in the 1998 Annual Report was $3,032,000. Actual dollars spent was $3,639,000 (see section G-iii). The difference is due primarily to an increase in new business projects, which include overhead extensions, underground extensions, and street lighting.

Projected 2000-2002 distribution capital dollars for projects directly related to the Illinois District in the 1998 Annual Report was $8,728,000. Projected dollars for the same period in the 1999 Annual Report is $11,324,000. The difference primarily results from an additional $200,000 per year projected to be spent on distribution transformers, and, an additional $600,000 per year projected to be spent on new business and governmental rebuilds.

**Distribution O&M Projects**

Distribution O&M includes a general array of periodic inspections and maintenance performed to maintain adequate mechanical and electrical properties for the safe and reliable operation of MidAmerican's distribution system. Included are the on-going tree trimming, distribution circuit and distribution equipment inspections listed in Attachment B.

Projected distribution O&M dollars for the Illinois District in 1999 from the 1998 Annual report was $7,175,000. Actual dollars spent was $7,114,000 (see section G-iii).

Projected 2000-2002 distribution O&M dollars for the Illinois District from the 1998 Annual Report was $22,740,000. Projected dollars for the same period in the 1999 Annual Report is $21,663,000.

## C. Number and Duration of Planned and Unplanned Interruptions and Impact on Customers [411.120 b) 3) C)]

**Planned and Unplanned Interruption Number and Duration**
**Illinois District**
**(January 1, 1999 – December 31, 1999)**

| Interruption Type | Number of Interruptions | Average Duration (per interruption) |
|---|---|---|
| Planned | 30 | 97 minutes |
| Unplanned | 3,895 | 147 minutes |

The impact of both planned and unplanned interruptions on Illinois District customers can be demonstrated by the number of customers experiencing interruptions and the average duration per customer interruption.

**Planned and Unplanned Interruption**
**Number and Duration by Affected Customer**
**Illinois District**
**(January 1, 1999 – December 31, 1999)**

| Interruption Type | Customers Interrupted | Average Duration (per customer interruption) |
|---|---|---|
| Planned | 3,909 | 19 minutes |
| Unplanned | 65,739 | 110 minutes |

## D. Number and Causes of Controllable Interruptions [411.120 b) 3) D)]

MidAmerican has identified the majority of interruption causes as uncontrollable[1]. The listing of controllable and uncontrollable interruption causes is provided in Attachment D.

Below is a summary of the number of controllable interruptions in the Illinois District during 1999.

**Illinois District**

**Controllable Interruptions**
**1999**

| Cause | Number |
|---|---|
| MEC Error | 8 |

1- This is a change from the 1998 Annual report where the majority of interruption causes were identified as controllable. For the 1999 Annual report MidAmerican reviewed the definition of controllable interruption and reclassified each interruption cause according to our understanding of the definition.

## E. Customer Interruptions due to another Utility, Independent System Operator, Alternative Retail Electric Supplier
[411.120 b) 3) E)]

There were zero outages in the Illinois District during 1999 due to another utility, independent system operator or alternative retail electric supplier.

## F. Reliability Comparison of Customers buying Electric Energy from MidAmerican Energy Company versus from Another Utility or ARES. [411.120 b) 3) F)]

There were no Illinois District customers buying energy from another utility or alternative retail electric supplier during 1999.

## G. Report on Reliability of Existing Transmission and Distribution Systems [411.120 b) 3) G)]

### i. Qualitative Characterization of MidAmerican Transmission and Distribution System [411.120 b) 3) G) i)]

MidAmerican's Illinois District transmission system is composed of approximately 3,825[1] poles and supporting structures with an average age of approximately 33 years. The Illinois District distribution system is composed of approximately 84,162 poles and supporting structures with an average age of approximately 29 years. These ages are based on a weighted average of the age of the poles and supporting structures. MidAmerican views the current condition of both the transmission and distribution system as safe, in good repair, and in compliance with the applicable laws and code(s).

The criteria used to assess the current condition of MidAmerican's Illinois District system are the results of recent inspections completed in compliance with the T&D inspection program described in Section 411.120 3) A) iii) of this Report. All Illinois District transmission and distribution lines are inspected on a 10-year cycle. In addition, the transmission lines are inspected by air or by drive-by at least annually for general condition, damage and right-of-way encroachments. These inspections provide first-hand, direct information that is the best source of information to use in making a qualitative assessment of the condition of MidAmerican's Illinois District transmission and distribution systems. Information gained from these inspections show that the transmission and distribution systems are adequate and where deficiencies are found they are repaired restoring the system to adequate condition. Therefore, based on these inspections and the deficiencies found and repaired, it is MidAmerican's judgment that

the condition of the transmission and distribution system is in good repair mechanically and electrically and able to provide safe and reliable service to MidAmerican's customers.

1- In MidAmerican's 1998 Annual Report of Electric Service Reliability, the number of transmission poles and supporting structures was reported erroneously as 13,586. This number has been changed to 3,825 in this filing to reflect the actual count.

## ii. Interruption and Voltage Variance Summary [411.120 b) 3) G) ii)]

MidAmerican's Illinois District serves 82,294 customers. In 1999, the Illinois District experienced 128,417 customer interruptions, which affected 79,253 customers. The total interruption time associated with these interruptions was 14,145,441 customer-minutes.

Reliability Indices for the Illinois District are as follows:

**ILLINOIS DISTRICT**
**1999 ELECTRIC RELIABILITY**
**INDICES**

| **S**YSTEM[1] **A**VERAGE **I**NTERRUPTION **F**REQUENCY **I**NDEX | **C**USTOMER[2] **A**VERAGE **I**NTERRUPTION **D**URATION **I**NDEX | **C**USTOMER[3] **A**VERAGE **I**NTERRUPTION **F**REQUENCY **I**NDEX |
|---|---|---|
| 1.620 | 110.15 | 1.953 |

$$1 - SAIFI = \frac{\text{Number of Customer Interruptions}}{\text{Number of Customers Served}} = \frac{\text{128,417 Customer-Interruptions}}{\text{79,253 Customers}^{1}}$$

$$2 - CAIDI = \frac{\text{Sum of all Interruption Durations}}{\text{Number of Customer Interruptions}} = \frac{\text{14,145,441 Customer-Interruption minutes}}{\text{128,417 Customer-Interruptions}}$$

$$3 - CAIFI = \frac{\text{Number of Customer Interruptions}}{\text{Number of Customers Affected}} = \frac{\text{128,417 Customer-Interruptions}}{\text{65,739 Customer Affected}}$$

1- This number differs from the Illinois total customer count of 82,294 because the 82,294 is based on a count of the total number of kwh and demand meters from MidAmerican's Customer Information System, and the 79,253 comes from the Electric Outage Management System (EOMS), which represents the number of customer premises where in some cases the customer premise has multiple meters.

## iii. Expenditures for Transmission Construction and Maintenance

[411.120 b) 3) G) iii)]

**Expenditures for Illinois District**
**Transmission Construction[1] and Maintenance[2]**
**($1,000's)**
**(1997 – 1999)**

| | 1999 | 1998 | 1997 |
|---|---|---|---|
| **Construction** | $ 128 | $ 656[3] | $ 4,652 |
| **O&M** | $ 1,394 | $ 1,383 | $ 1,427 |
| **Total** | $ 1,522 | $ 2,039 | $ 6,079 |

1- This represents capital dollars for projects historically budgeted as transmission and directly attributable to the Illinois District.

2- The dollars for 1997 and 1998 come from MidAmerican's FORM 21 ILCC filing with the Illinois Commerce Commission, page 5, Section VIII. 'Operating Revenues and Expenses', Line No. 4 'Transmission' for December 31 of the year as noted. In the FORM 21 ILCC 1999 filing, the dollars for 'Transmission' were not listed separately and therefore were broken out.

3- In MidAmerican's 1998 Annual Report of Electric Service Reliability, the construction dollars for 1996 were transposed with the 1998 dollars. In this filing, the 1998 dollars have been changed from $842,000, as listed in the 1998 filing, to the correct amount of $656,000.

Transmission construction dollars were higher in 1997 due to construction of a new 161/13 kV two transformer substation (Substation 49) and associated 161 kV transmission lines in the Illinois District.

**Ratio of Illinois District Transmission Construction and Maintenance Expenditures**
**To Illinois District Transmission Investment**
**(1997 – 1999)**

| | 1999 | 1998 | 1997 |
|---|---|---|---|
| **Transmission Investment (depreciated)** | $34,311,946 | $32,426,637 | $32,308,172 |
| **Ratio (Total/ Transmission Investment (depreciated))** | 4.4% | 6.3% | 18.8% |

**Average Remaining Depreciation Lives of Illinois District Transmission Facilities As a Percent of Total Depreciation Lives (1997 – 1999)**

| Account | Description | % Remaining Life | | |
|---|---|---|---|---|
| | | 1999 | 1998 | 1997 |
| 350.1 | Land Rights | 52% | 53% | 55% |
| 352 | Structures | 68% | 64% | 58% |
| 353 | Station Equipment | 68% | 69% | 71% |
| 354 | Towers & Fixtures | 50% | 52% | 54% |
| 355 | Poles & Fixtures | 69% | 70% | 71% |
| 356 | Overhead Conductor Devices | 62% | 63% | 63% |
| 356.1 | Overhead Conductor Devices - IowaPower | 14% | 19% | 24% |
| 358 | Underground Conductor Devices | 56% | 58% | 59% |
| 359 | Roads & Trails | 23% | 25% | 27% |

## iv. Expenditures for Distribution Construction and Maintenance

[411.120 b) 3) G) iv)]

**Expenditures for Illinois District Distribution Construction[1] and Maintenance[2] ($1,000's) (1997 – 1999)**

| | 1999 | 1998 | 1997 |
|---|---|---|---|
| **Construction** | $ 3,639 | $ 4,088 | $ 2,833 |
| **O&M** | $ 7,114 | $ 6,765 | $ 7,399 |
| **Total** | $ 10,753 | $ 10,853 | $ 10,232 |

1- This represents specific Illinois District project dollars historically budgeted as distribution and an allocation of specific project common dollars historically budgeted as distribution to the Illinois District.

2- These dollars come from MidAmerican's FORM 21 ILCC filing with the Illinois Commerce Commission, page 5, Section VIII. 'Operating Revenues and Expenses', Line No. 4 'Distribution' for December 31 of the year as noted. . In the 1999 Form 21 ILCC filing, the dollars for 'Distribution' were not listed separately and therefore were broken out.

**Ratio of Illinois District Distribution Construction and Maintenance Expenditures To Illinois District Distribution Investment (1997 – 1999)**

| | 1999 | 1998 | 1997 |
|---|---|---|---|
| **Distribution Investment (depreciated)** | $64,318,142 | $ 68,039,834 | $ 65,934,447 |
| **Ratio (Total/ Distribution Investment (depreciated))** | 16.7% | 16.0% | 15.5% |

**Average Remaining Depreciation Lives of Illinois District Distribution Facilities As a Percent of Total Depreciation Lives (1997 – 1999)**

| Account | Description | % Remaining Life | | |
|---|---|---|---|---|
| | | 1999 | 1998 | 1997 |
| 360.1 | Land Rights | 65% | 67% | 62% |
| 361 | Structures | 67% | 68% | 66% |
| 362 | Station Equipment | 66% | 66% | 67% |
| 364 | Poles/Towers/Fixtures | 60% | 61% | 62% |
| 365 | Overhead Conductor | 68% | 69% | 70% |
| 366 | Underground Conduit | 66% | 67% | 68% |
| 367 | Underground Conductor Devices | 72% | 72% | 73% |
| 368 | Line Transformers | 63% | 63% | 64% |
| 369 | Services | 65% | 66% | 66% |
| 370 | Meters | 67% | 68% | 68% |
| 371 | Installations on Customers Premises | 54% | 55% | 57% |
| 373 | Street Lights | 78% | 79% | 80% |

## v. Customer Satisfaction Survey Results [411.120 b) 3) G) v)]

See Attachment E for the results of the Illinois District Residential and Commercial Reliability Survey. Due to the small sample size used in the survey, the results are subject to an error of plus or minus ten percent.

## vi. Overview of Customer Reliability Complaints [411.120 b) G) vi)]

There were no Illinois District electric reliability complaints made to the Illinois Commerce Commission and forwarded to MidAmerican's Customer Service Quality Department in 1999.

## H. Reliability Indices [411.120 b) H)]

**ILLINOIS DISTRICT**
**1999 ELECTRIC RELIABILITY**
**INDICES**

| **S**YSTEM[1] **A**VERAGE **I**NTERRUPTION **F**REQUENCY **I**NDEX | **C**USTOMER[2] **A**VERAGE **I**NTERRUPTION **D**URATION **I**NDEX | **C**USTOMER[3] **A**VERAGE **I**NTERRUPTION **F**REQUENCY **I**NDEX |
|---|---|---|
| 1.620 | 110.15 | 1.953 |

$$1 - SAIFI = \frac{\text{Number of Customer Interruptions}}{\text{Number of Customers Served}} = \frac{128{,}417 \text{ Customer-Interruptions}}{79{,}253^{1} \text{ Customers}}$$

$$2 - CAIDI = \frac{\text{Sum of all Interruption Durations}}{\text{Number of Customer Interruptions}} = \frac{14{,}145{,}441 \text{ Customer-Interruption minutes}}{128{,}417 \text{ Customer-Interruptions}}$$

$$3 - CAIFI = \frac{\text{Number of Customer Interruptions}}{\text{Number of Customers Affected}} = \frac{128{,}417 \text{ Customer-Interruptions}}{79{,}253 \text{ Customers Affected}}$$

1- This number differs from the Illinois total customer count of 82,294 because the 82,294 is based on a count of the total number of kwh and demand meters from MidAmerican's Customer Information System, and the 79,253 comes from the Electric Outage Management System (EOMS), which represents the number of customer premises where in some cases the customer premise has multiple meters.

## I. Worst Performing Circuits [411.120 b) I)]

The following table shows the worst performing circuits in 1999 in the Illinois District according to the calculated indices.

**Illinois District Worst Performing Circuits of 1999**

| Index Used | Index Value | Circuit Designation | Number of Customers |
|---|---|---|---|
| SAIFI | 3.762 | 440149-546081 | 1051 |
| CAIDI | 382.93 | 478169-568227 | 1020 |
| CAIFI | 3.762 | 440149-546081 | 1051 |

## J. Operating & Maintenance History of the Worst-Performing Circuit [411.120 b) 3) J)]

**Circuit 440149-546081**

$$SAIFI = \frac{\text{Number of Customer Interruptions}}{\text{Number of Customers Served}} = \frac{3{,}954 \text{ Customer-Interruptions}}{1051 \text{ Customers}}$$

$$\text{CAIFI} = \frac{\text{Number of Customer Interruptions}}{\text{Number of Customers Affected}} = \frac{\text{3,954 Customer-Interruptions}}{\text{1,051 Customers Affected}}$$

The circuit with the highest SAIFI and CAIFI indices was circuit 440149-546081, which had 1,051 customers in 1999. The SAIFI and CAIFI indices are due primarily to three equipment related outages that resulted in 1,986 customer-interruptions and three animal related outages that resulted in 877 customer-interruptions.

This circuit was last inspected in 1991 and is scheduled for inspection again in 2001 as part of the 10-year cycle over which all Illinois underground and overhead distribution circuits and poles are patrolled and inspected. The average cost of a distribution circuit inspection is $11,500. Animal guards are scheduled to be installed on this circuit in 2000. The total projected cost of the animal guard installations is $10,600.

**Circuit 478169-568227**

$$\text{CAIDI} = \frac{\text{Sum of all Interruption Durations}}{\text{Number of Customer Interruptions}} = \frac{\text{947,764 Customer-Interruption minutes}}{\text{2,475 Customer-Interruptions}}$$

The circuit with the highest CAIDI index was circuit 478169-568227, which had 1,020 customers in 1999. This circuit's CAIDI index was elevated primarily due to two separate interruptions. One of the interruptions involved a vehicle hitting a pole and interrupting 155 customers for 644 minutes. The second outage involved tree contact with the distribution primary, which interrupted 74 customers for 496 minutes.

This circuit was last inspected in 1997 and an estimated $7,100 was spent to make corrective repairs. These corrections were completed in 1998. Since the primary cause of the large CAIDI index for this circuit was a vehicle hitting a pole, no additional circuit repairs or upgrades are planned at this time. Tree trimming on this circuit was completed in 1999 at a cost of $45,000. Circuit inspection and tree trimming are scheduled on a 10 year and three year cycle, respectively.

## K. Three Year Customer Outage Frequency Data [411.120 b) 3) K)]

No report is due until the June 1, 2001 filing.

## L. Three Year Customer Outage Duration Data [411.120 b) 3) L)]

No report is due until the June 1, 2001 filing.

## M. Contact Person [411.120 b) 3) M)]

Any requests for additional information should be directed to:

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